HOWARD HANSON DAM
PRELIMINARY COST ALLOCATION
CONSIDERING ESA REQUIREMENTS
November, 2000

1. Background Information. Construction of the Howard Hanson Dam (HHD) was completed in 1962. The project contains 106,000 acre-feet (AF) of flood control storage with a pool of 26,000 AF for low flow augmentation (LFA) for fish and wildlife. The original authorization included irrigation and municipal and industrial (M&I) water supply, but such measures were never implemented. A Section 1135 project was implemented in 1998 to primarily provide 5,000 additional acre-feet for LFA. The project lies entirely within the City of Tacoma municipal watershed and there is no public access.

2. ESA Listing. Since the Howard Hanson Dam Additional Water Storage Project (AWSP) Feasibility Report was published and approved, Puget Sound Chinook salmon have been listed as a threatened species under the Endangered Species Act (ESA). The listing necessitates action on the part of the Corps because of the impacts of the existing project. The project seriously impairs downstream passage of the listed species, and blocks downstream transport of habitat critical gravel and wood debris (see paragraph 5 for more information). Mitigation of these impacts is required under ESA. Therefore, the project sponsor has requested the Corps re-visit the cost allocation of this project because of the shifted responsibilities of ESA relevant project features for the existing Howard Hanson Dam Project.

3. ESA Required Features. Under Section 7 consultation with the National Marine Fisheries Service (NMFS), a final determination of all ESA requirements associated with the Howard Hanson Dam Project has been made in the NMFS's Biological Opinion (BO) after their review of the Corp's Biological Assessment (BA). The BO clearly delineated the Corps' existing project vs. AWSP project responsibilities under ESA. According to the BO, the following four measures are to be implemented in order to meet minimum ESA requirements for the existing project (in the without AWSP condition).

- Construction of the fish passage facility recommended in the Feasibility Report but constructed to pool elevation 1147 (instead of elevation 1177).
- Monitoring associated with the fish passage facility.
- Gravel nourishment below the dam.
- Woody debris placement below the dam.

4. Federal Responsibility for Costs Assigned to ESA. Howard Hanson Dam was authorized on May 17, 1950, by PL 81-516 (substantially in accordance with HD 271)

and does not mention local cooperation requirements (the House Document only recommended that the "local interests" contribute in cash $2,000,000 toward the cost of the project). Neither the authorization nor the House Document contained any requirement for the locals to have any continuing responsibility or liability for the project. There is no requirement for O&M cost sharing or for provision of lands, easements, rights-of-way, "hold and save", etc. There are no water supply contracts or other types of agreements with non-federal entities regarding the construction of the original project. Simply stated, with no existing non-federal sponsor for the original project, there are no non-federal responsibilities for ESA issues pertaining to the original construction of the dam. Furthermore, nowhere is it apparent that construction of a fish passage facility, gravel nourishment, and placement of large woody debris at and near HHD reduces the ESA obligations of other organizations or landowners in the Green River Basin. The dam blocks downstream passage of fish, gravel transport, and woody debris transport. The impacts of the HHD on the environment necessitating the aforementioned measures under ESA are the responsibilities of NWS and the Federal government alone. Therefore, the ESA requirements for the original dam construction are to be 100% federally funded with no cost sharing.

5. Fish Passage Feasibility Study Alternatives Re-evaluated Under ESA

After re-evaluating the alternatives formulated in the AWSP Feasibility Study from the point of view of ESA, it was concluded that the AWSP selected alternative for fish passage is also the least cost approach to satisfy ESA requirements for the existing project. This result was expected because, during the feasibility study of the AWSP, fish passage alternatives were evaluated according to environmental restoration criteria and the criteria closely paralleled the requirements of ESA. In fact, NMFS provided NWS early on with clear direction that the level of fish passage selected in the HHD AWSP Feasibility Study/EIS would be required for continued operation of the existing HHD project under ESA. NMFS personnel were included as members of the Fish Passage Technical Committee that provided objectives and criteria during formulation of the fish passage alternatives. In addition, NMFS has reviewed all of the fish passage alternatives presented in the plan formulation appendix of the HHD feasibility report. From the participation and review NMFS has determined that the fish passage facility recommended in the feasibility report is the minimum "without project" facility that would be required under ESA. The only difference in requirements between the existing project and the AWSP under ESA is that the fish passage facility would be constructed to elevation 1147 for the existing project and to elevation 1177 for the AWSP. As a result, most of the cost items currently included in the AWSP for fish passage would be required in the "without project" condition, according to the requirements of ESA.

The ESA alternatives are analyzed below. Note that any single downstream fish passage measure is dependent on upstream fish passage and vice versa. That is, for ESA goals, downstream fish passage for juvenile salmon and steelhead is inadequate without upstream fish passage.

- **Removal of existing dam.** To provide near natural riverine conditions and total restoration of fish upstream and downstream fish passage, either the entire dam would be removed or a portion breached to recreate the existing Green River channel for unimpeded fish passage. This alternative could meet ESA downstream fish passage survival but was eliminated for two reasons. (1) it would result in extensive flooding of major commercial developments in the Green River Valley creating massive flood damages and would therefore be too costly, and (2) it would reduce the survival of ESA-listed adult salmon spawning downstream of the dam because of loss of low flow augmentation.

- **Eliminate Permanent Pool.** Elimination of conservation pool (25,000 AF) to create a "run of the river" project would theoretically eliminate most barriers to downstream and upstream fish passage. This alternative was eliminated as it would reduce the survival of ESA-listed adult salmon spawning downstream of the dam because of loss of low flow augmentation. Without flow augmentation the Green River essentially dries up 1 in 5 years and in other year instream flows would be too low for most fish to successfully spawn. In addition, the National Marine Fisheries Service considers low flow augmentation an existing condition in Tacoma's Habitat Conservation Plan and therefore low flow augmentation cannot be foregone without putting Green River chinook salmon in a jeopardy situation.

- **Increase Existing Hatchery Production**. This measure would expand existing hatchery programs to provide replacement of lost production in the downstream portion of the river in lieu of restoring Upper Green River salmon and steelhead runs. This alternative was eliminated because it does not provide access to critical salmon habitat above HHD and therefore will not satisfy ESA requirements.

- **Permanent Supplementation Programs.** This measure would use project features constructed to "naturalize" the rearing of juvenile hatchery fish. Specific examples include: (1) creation, maintenance and stocking of permanent natural rearing facilities such as ponds; and (2) expansion of the Muckelshoot Indian Tribe (MIT) fish restoration facility. This alternative was eliminated as it does not provide access to critical salmon habitat above HHD and therefore will not satisfy ESA requirements.

- **Temporary Supplementation Programs.** A short-term rearing program to provide additional production of salmon and steelhead to "jump start" the recovery and restoration of salmon and steelhead to the Upper Green River could include: (1) creation of additional habitat locations where hatchery reared juveniles cold be planted for natural rearing; (2) short-term increases in outplanting of smolt ready juveniles; and (3) development of remote site facilities such as egg boxes. This alternative was eliminated as a distinct measure because it will not satisfy ESA requirements, and because the City of

Tacoma is providing funding for potential implementation of items 1 and 2 listed above, separately from the proposed AWSP.

The following alternatives deal exclusively with downstream fish passage and assume that upstream fish passage continues to be provided by the Tacoma as provided for in their Habitat Conservation Plan being prepared as part of their Section 10 consultation with NMFS. The feasibility report numbering system is used here for clarity in discussion and understanding. Ten distinct downstream fish passage sub-alternatives were evaluated, eight at the dam and two above the dam. Of the eight independent alternatives at the dam, only 9A7 and 9A8 would meet ESA requirements for fish survival. Of these two, 9A8 was the least cost. Of the two alternatives above the dam, neither 9B1 nor 9B2 were cost effective by themselves. B1 in combination with A4 or A8 and B2 in combination with A8 were cost effective and would meet ESA requirements for fish survival but were more expensive than measure A8. Measure 9A8 was the least cost measure that would meet minimum ESA requirements for fish passage at HHD.

- **9A1 Add a Pinch Value to the existing 48-inch By-Pass Pipe.** Modification of the existing 48-inch bypass pipeline by adding a 48-inch pinch valve to provide a more fish friendly outlet through the addition of a 4-foot diameter pinch valve. This alternative met few of the fish passage design criteria and fish survival did not meet ESA requirements. This alternative was eliminated from consideration.

- **9A2 – Alternative 9A1 plus Smoothing of Pipe Curves.** Same as the above measure plus a smoothing of three downstream bends in the existing 48-inch bypass pipeline. This alternative is a slight improvement over 9A1 but it also met few design criteria, fish survival did not meet ESA requirements and it was eliminated from consideration.

- **9A3 – Alternative 9A1 and 9A2 Plus Wet Well Chamber.** Consists of the above measure plus with the addition of a wet well chamber within the existing intake tower. This alternative provides for a small surface outlet but did not meet many of the design criteria, fish survival did not meet ESA requirements and, therefore, it was eliminated from consideration.

- **9A4 – Alternative 9A1 and 9A2 plus a Surface Collector on the Existing Tower.** Includes the first two measures plus an upstream "gulper" collector mounted on the existing intake tower and gate hoist structure. This alternative fails to meet flow capacity and several other design criteria and fish survival did not meet ESA requirements.

- **9A5 – New Tower with Single Lock/Single Screen Connected to the Existing Tower.** Consists of a new intake tower with a single modular incline screen and single lock. This alternative meets more design criteria than 9A4

but still fails to provide desired attraction flows (flow capacity) and fish survival did not meet ESA requirements.

- **9A6 – New Tower with Single Lock/Single Screen and New Tunnel and Stilling Basin.** Consists of a new intake tower similar to the previous measure except outflow conduits are routed through a new 2000-foot long tunnel to a portal area downstream of the existing spillway. This alternative does not meet attraction flow criteria and does not meet ESA fish survival requirements.

- **9A7 – New Tower with Double Lock/Double Screen and New Tunnel and Stilling Basin.** Same intake tower as previous two measures except there are two intake horns, two modular incline screens, and two fish locks. Outfall would be similar to the above measure and would pass through a new tunnel to downstream portal and stilling basin. This design meets all design criteria and ESA requirement for fish passage. This alternative however, is the most expensive evaluated and is not as cost effective as other measures which meet required design and ESA requirements.

- **9A8 – New Tower with One Enlarged Screen in Single Lock and New Tunnel.** Consists of constructing a new intake tower with an enlarged modular incline screen with a fish lock. A live box would capture fish within the lock when the lock is in the process of being evacuated. Outfall would be routed through a new tunnel and stilling basin. An attenuation chamber would be provided at the tunnel outlet. This alternative meets all design criteria, is the most cost effective least cost alternative which meets ESA requirements. This was the preferred alternative of the AWS project.

- **9B1 – Fish Collector above Reservoir with Truck Transport.** Comprised of a fish collector located on the mainstem of the Green River above the reservoir. It would consist of a bank of modular incline screens, a permanent spillway, a seasonal rubber dam. Fish would be trapped and transported around the dam by truck. The incremental cost and cost effectiveness analysis shows that this alternative by itself is not cost effective and was eliminated. This alternative in combination with 9A4 or 9A8 was cost effective, met all design criteria and met ESA requirements but was significantly more expensive than alternative 9A8. In addition, trucking of juvenile fish can increase stress, increase disease transmission and may reduce the natural homing ability of adults.

- **9B2 Fish Collector above Reservoir with Flume Transport.** Same as above measure except transport around dam would be via an open channel using the existing railroad grade. This alternative by itself is not cost effective as it produces less fish than 9A8 and costs more. This alternative in combination with 9A8 is considered to be cost effective but was rejected for the same

reason as 9B1. In addition, transport by flume involves other issues such as confinement, increased water temperature and real estate along an active rail line.

6. Other ESA Measures

Regarding ESA measures other than fish passage, the existing project has resulted in gravel and woody debris blockage from the river downstream of the dam. For example, forty years of trapping gravel-size sediments by HHD has resulted in an ongoing loss of spawning gravel for almost 20 miles downstream of the dam. HHD is estimated to trap an average of 8,000 to 12,000 cubic yards of gravel-sized sediment each year. Lack of gravel nourishment is a dynamic condition resulting in continuing degradation to the existing river habitat for 20 miles with a new additional annual loss in salmon spawning habitat of up to 1,000 lineal feet downstream of the already degraded 20 miles. The gravel nourishment measure under the AWSP will only contribute 1/3 to ½ to the pre-dam sediment transport regime. It does nothing to replenish the 320,000 to 480,000 CY of gravel that has been blocked from the 20 miles of river downstream of the HHD over the years. NMFS has already advised NWS that we will be required to at least double the volume of gravel to meet minimum ESA requirements. Funding for the additional 4,000 CY of gravel will have to be provided by sources outside the AWS project. Purchase and transport of gravel from nearby commercial pits was the least cost alternative available compared to re-plumbing the dam with a different floodway tunnel capable of passing gravel or by dredging the reservoir.

The large woody debris measure is similar to gravel. Woody debris is transported by the river and trapped in HHD reservoir. This results in an ongoing loss to existing habitat of acres of organic material that is trapped and removed from the river ecosystem each year. The volume of woody debris planned for collection and transport below HHD under the AWSP is only equivalent to at most 1/3 of the volume of material currently trapped by the dam.

7. Preliminary Cost Allocation. The purpose of this revision is to determine how much of the costs of the proposed multiple-purpose project are associated with ESA requirements under without project conditions and to determine the preliminary percentage of construction costs to be paid by the local sponsor and federal government. Because an itemized listing of operation and maintenance costs is not yet available, this revised cost allocation only addresses construction cost. However, O&M costs associated with construction of ESA items (fish passage, monitoring and placement of gravel and woody debris downstream of the dam) will also be the responsibility of the federal government.

Following are the assumptions and parameters used in this revised cost allocation:

(a) This revised cost allocation is based on October 1997 prices and costs - as presented in the Howard Hanson Dam Additional Water Storage Project Feasibility Report and Environmental Impact Statement dated August, 1998.

(b) It was assumed that the construction costs assigned to ESA requirements *plus* the remaining multiple purpose project costs would sum to the total multiple purpose construction cost presented in the HHD Feasibility Report. That is, it is assumed the proposed multiple-purpose project will be constructed and the goal of the allocation is to determine how much of the proposed project is associated with ESA requirements.

(c) Using the cost for the multiple-purpose project presented in the Feasibility Report, which includes the "A-8" fish passage facility constructed to elevation 1177, the costs for the same A-8 fish passage facility, but constructed to elevation 1147 were computed. Then the cost of the fish passage facility constructed to elevation 1147 was assigned to ESA.

(d) The incremental cost in building a fish passage facility to Elev. 1177 from Elev. 1147 consists of a difference in stoplogs and wet well wall costs, electrical work, and mobilization costs. Compared to the fish passage facility constructed to elevation 1177, the stop logs and exterior wet well wall would be reduced by 30 feet and some of the electrical work would be reduced. The reduction in cost for a fish passage to 1147 vs. 1177 including contingencies and EDS&A totals $1,005,000. Per the project designer, the tower under both scenarios would still be constructed to elevation 1254. All other fish passage costs would be the same for the two facilities. ESA fish passage costs were estimated to be $44,587,000.

(e) Other costs assigned to ESA include a portion of the monitoring cost plus a portion of the fish habitat restoration cost. All monitoring costs associated with the fish passage facility (about 60% of the total cost of monitoring) were assigned to ESA or $2,520,000. Another $178,000 for gravel placement and some woody debris placement was also assigned to ESA. Total cost allocated to ESA, including the fish passage, monitoring, gravel placement and woody debris is $47,285,000.

(f) In accordance with ER 1105-2-100, Planning Guidance Notebook, Appendix E, Section IX, Multi-purpose Projects, a multiple-purpose project with a project purpose excluded is the same as a single purpose project. That is, a multiple purpose project without water supply is the same as a single purpose restoration project. This is the same assumption used in Feasibility Report.

(g) Single-Purpose Water Supply project, constructed to elevation 1169 (1147 feet plus 22 feet for water supply) and Single Purpose Restoration project, constructed to elevation 1155 (1147 plus 8 feet for low flow augmentation), assume the A-8 fish passage facility (ESA fish passage facility) to elevation 1147 is in place and part of the without project condition. The single purpose restoration project also assumes

that the $178,000 for gravel placement and woody debris has been accomplished in the without project condition as part of the ESA requirements.

(h) Other Assumptions and Parameters - Feature costs of the full multiple-purpose project set the limit for costs assigned to fish passage at elevation 1147.

- **Mob & De-Mob** – Cost for the full multiple purpose project is $1,220,000. Costs assigned to fish passage and single purpose projects were proportioned based on their construction costs.

- **Roads and Parking** – Cost for full multiple purpose project is $2,979,000. Road cost for fish passage to 1177 is $2,979,000. Road costs for fish passage to elevation 1147 is actually greater than $2,979,000 but the cost assigned to fish passage 1147 was limited to $2,979,000. Road costs for the single purpose projects was based on having to relocate part of the road costs associated with having a fish passage at elevation 1147 in place.

- **Approach and Inlet Channel** – Like roads and parking, the cost for the approach and inlet channel for fish passage to elevation 1147 is greater than the approach and inlet cost of a fish passage to 1177. Like roads and parking, the ESA cost assigned to fish passage at 1147 was limited to the cost at 1177.

8. Allocation of Project Costs.

This preliminary cost allocation analysis first assigns project costs to the requirements of the Endangered Species Act and then allocates the remaining project costs using the cost allocation presented in the Feasibility Report.

While the proposed project does not affect the outputs of the existing project, the project does add two additional project purposes, both with different cost sharing requirements. As project sponsor, Tacoma Water Division is responsible for paying 100% of the construction costs allocable to water supply and 35% of the construction allocable to ecosystem restoration. The federal government is responsible for paying all costs assigned to ESA. As a result, an allocation of the proposed project construction costs is necessary.

Operation and Maintenance costs were not addressed in this cost allocation.

9. Cost Allocation Methodology

Since ecosystem restoration benefits are not quantified in dollar terms, a *modified separable cost - remaining benefits (SCRB) cost allocation methodology* was developed and used for this project. This cost allocation methodology has been approved by HQUSACE and is considered to provide an equitable allocation of construction costs to each authorized project purpose. Following are definitions of costs that apply to the cost allocation methodology:

- Specific Costs - Are those accounting feature(s) or sub-feature(s) cost, all of which are associated with only one project purpose.

- Separable Costs - Are the costs incurred by adding a project purpose. These costs include all specific costs plus that portion of the joint costs identified as belonging to only one project purpose. These costs represent the difference in cost between the multiple purpose project and the multiple purpose project with a project purpose omitted.

- Joint-Use Costs - Are the total costs allocated to a project purpose (separable plus allocated residual joint costs) minus the specific costs.

- Joint-Use Percentage - The proportion of joint-use costs to be allocated to each project purpose.

This methodology uses an SCRB-like method of allocation except that since there are no dollar quantified benefits for restoration, the benefits of restoration are assumed to be at least as great as the cost of the alternative single-purpose restoration. Therefore, the cost of the single purpose restoration project is used in the allocation. Like the SCRB method, specific and separable costs are identified and quantified and used in determining the total allocation to each project purpose and in determining the joint-use percentage to be used in allocating the joint-use construction costs of the project.

In order to determine the separable costs of the proposed project, the costs of the multiple-purpose project with a function omitted are computed and compared to the cost of the multiple purpose project. The difference in cost represents the separable costs of that purpose. Due to some uncertainty about the length of time/cost of monitoring funded with construction dollars, the following discussion of the cost allocation excludes the monitoring associated with construction. Monitoring costs were handled separately and are discussed in section 2.8.4f of this report. Since monitoring costs are considered specific costs to either water supply or ecosystem restoration, the exclusion of these costs from this part of the allocation will not influence the determination of the joint-use percentage used to allocate joint-use costs.

a. Multiple-Purpose Projects With Function Omitted.

The construction cost estimates for each of these projects were determined based on input from the design and cost engineers. Each accounting feature line item presented in the multiple-purpose project was evaluated with respect to each of these multiple purpose projects with a function omitted. Following is a discussion of each project:

(1) Without M&I Water Supply. Facilities and operation of the project with water supply omitted would be the same as the alternative single-purpose, ecosystem restoration project. This alternative would provide ecosystem restoration benefits equal to those of

the multiple purpose project. This project would consist of a single purpose restoration project constructed at the same site to pool elevation 1155 (1147 plus 8 feet for low flow augmentation). A fish passage facility similar to the multiple purpose project (A8) would be constructed but to elevation 1155 instead of elevation 1177. However, this fish passage would, like the multiple purpose project, have the vent line and casing constructed to elevation 1254. The habitat improvement measures would be the same as the multiple purpose project. Right Bank seepage treatment would also be performed but only to elevation 1155. The construction cost of this project in October 1997 prices is estimated at $10,449,000 and is shown in table B2-29.

(2) Without Ecosystem Restoration. Facilities and operation of the project with ecosystem omitted would be the same as the alternative single-purpose water supply project. This alternative would provide water supply benefits equal to those of the multiple-purpose project. This project would consist of a single purpose water supply project constructed at the same site to pool elevation 1169 (1147 feet plus 22 feet for water supply). Fish mitigation would consist of a fish passage facility similar to measure A4 but constructed to elevation 1169, instead of 1177. Other mitigation measures associated with water supply impacts would be the same as the multiple purpose project. Right Bank seepage treatment would also be performed but to pool elevation of 1169, instead of 1177. Cost of this project in October 1997 prices is estimated at $16,017,000 and is shown in table B2-29.

Also shown in Table B2-29 are the construction costs, by accounting feature and sub-feature for the multiple-purpose project and the costs of the multiple-purpose projects with a function omitted. Since this proposed project has two purposes, the multiple-purpose projects with a purpose omitted also serves as the single purpose project. This is consistent with the “Libby Dam Project, Design Memorandum 29, Cost Allocation, dated November, 1976”.

TABLE B2-29. HOWARD HANSON DAM WATER SUPPLY AND ECOSYSTEM RESTORATION PROJECT COST ALLOCATION[1] (OCTOBER 1997 PRICES)

	Multiple -Purpose Project		Multiple-Purpose Projects With Function Omitted			
Permanent Features	**Specific Water Supply**	**Specific Restor.**	**Joint Use**	**Total**	**Without Restor.[2]**	**Without W.S.[3]**
01. Land & Damages			$3,948,000	$3,948,000	$2,600,000	$1,335,000
04. Dams						
4.03 Outlet Works						
03.01 - 03.10 [4]			400,000	400,000	1,588,000	567,000
03.11 Foundation Work	$0		0	0	0	0
03.12 Seepage Control [5]			10,276,000	10,276,000	6,781,000	3,495,000
03.29 App. & Outlet Ch.	0		0	0	0	0
03.54 - 03.57 [6]			905,000	905,000	1,354,000	517,000
03.99.01 Electrical			100,000	100,000	70,000	30,000
03.99.02 Crane	0		0	0	0	0
06. Fish & Wildlife						
03.99 Wildlife Hab. Mit.						
Phase 1	$1,718,000	$0		1,718,000	1,718,000	0
Phase 2			1,233,000	1,233,000	247,000	986,000
03.99 Fish Hab. Mit.						
Phase 1	1,159,000	0		1,159,000	1,159,000	0
Phase 2			2,386,000	2,386,000	500,000	1,886,000
03.99 Fish Hab. Rest.						
Phase 1	0	1,633,000		1,633,000	0	1,633,000
Total Project Cost	**$2,877,000**	**$1,633,000**	**$19,248,000**	**$23,758,000**	**$16,017,000**	**$10,449,000**

[1] Excludes labor costs associated with project fish and wildlife monitoring of $4,263,000.

[2] Also serves as single purpose water supply project. See Libby Dam Project, Design Memorandum 29, Cost Allocation, Nov, 1976.

[3] Also serves as single purpose restoration project. See Libby Dam Project, Design Memorandum 29, Cost Allocation, Nov, 1976.

[4] Includes: Mob & demob., coffer dam, roads and parking, bridge, buildings, and earthwork.

[5] Includes: Grouting, feeder wells, adit extension, horizontal drains, pressure gauge, and rock blanket,

[6] Includes: Tunnel and Conduit, intake gates and equipment, and intake structure.

b. Specific Cost Line Items. As shown in table B2.29, specific cost line items by accounting feature/sub-feature (not including monitoring) consist of the following:

		Specific Project Purpose
6.03.99.1	Construction of all wildlife & fish habitat mitigation sites during Phase 1.	M&I Water Supply
6.03.99.2	Construction of fish restoration sites during phase 1.	Ecosystem Restoration

c. Determination of Separable Costs. The cost information for the multiple purpose project and multiple purpose project with a function omitted shown in Table B2-29 is used in Table B2-30 to determine the separable cost of each project purpose. As shown in Table B2-30, separable costs of water supply total $13,309,000 and the separable costs of ecosystem restoration total $7,741,000. Separable costs total $21,050,000 leaving $2,708,000 in joint costs.

TABLE B2-30. HOWARD HANSON DAM WATER SUPPLY AND ECOSYSTEM RESTORATION PROJECT DETERMINATION OF SEPARABLE AND RESIDUAL JOINT COSTS (OCTOBER 1997 PRICES IN $1,000)

	Project Cost
MULTIPLE-PURPOSE PROJECT	$23,758 [7]
MULTIPLE-PURPOSE WITH FUNCTION OMITTED:	
Without Water Supply	$10,449
Without Restoration	16,017
SEPARABLE COSTS:	
Water Supply	13,309
Restoration	7,741
TOTAL SEPARABLE COSTS	$21,050
RESIDUAL JOINT-USE COSTS	$2,708

d. Determination of Joint-Use Percentage. As previously mentioned, since the project purpose of ecosystem restoration does not have benefits which are quantified in dollar terms, a modified SCRB cost allocation was used to determine the joint-use percentage to

[7] Excludes monitoring costs of $4,263,000 for restoration and mitigation facilities and sites.

each project purpose. The cost allocation using this methodology is shown in table B2-32. Conclusions of the Howard Hanson Dam Additional Water Storage Project joint-use cost allocation are presented in table B2-31 and show that of the total joint-use construction cost, 61.2 percent is to be allocated to M&I water supply and 38.8 percent is to be allocated to ecosystem restoration. Percentages to be allocated to each project purpose were rounded to the nearest 1/10 of 1 percent for application to financial records.

TABLE B2-31 HOWARD HANSON DAM ADDITIONAL WATER STORAGE PROJECT SUMMARY OF JOINT-USE PERCENTAGES

Project Purpose	Percent of Joint-Use Construction Costs
M&I Water Supply	**61.2%**
Ecosystem Restoration	**38.8%**

TABLE B2-32 HOWARD HANSON DAM ADDITIONAL STORAGE PROJECT CONSTRUCTION COST ALLOCATION BY MODIFIED SEPARABLE COST-REMAINING BENEFITS METHOD (October 1997 Prices in $1,000)

Allocation of Construction Costs	M&I Water Supply	Ecosystem Restoration
a. Capitalized Benefits	$19,267,000	N/A
b. Alternative S/P Const.Costs	16,017,000	$10,449,000
c. Limited Benefits	16,017,000	10,449,000
d. Separable Const. Costs	13,309,000	7,741,000
e. Remaining Benefits/Costs	2,708,000	2,708,000
f. Percent Remaining	50.0%	50.0%
g. Allocated Resid. Const. Costs	1,354,000	1,354,000
h. Total Allocation Const. Costs	14,663,000	9,095,000
i. Specific Const. Costs	2,877,000	1,633,000
j. Joint-Use Const. Costs	11,786,000	7,462,000
k. **Joint-Use Percent**	**61.2%**	**38.8%**

e. Allocation of Fish and Wildlife Monitoring Costs. Due to on going discussion regarding the acceptable level of construction related monitoring, the allocation of these costs was treated separately. Labor cost for monitoring fish and wildlife facilities during construction for phase 1 and 2 are expected to be expended over 10 years in some cases. All monitoring costs expended over this time frame are considered to be construction costs and have been included as part of the overall project cost allocation of construction costs. Labor costs associated with monitoring the fish and wildlife features (restoration and mitigation) of the proposed project consist of four major items. These items and years of monitoring consist of: (1) downstream impacts to habitat and aquatic resources (1-5); (2) fish habitat restoration (1-5 and 10); (3) fish habitat mitigation (years 0-5 and 10); (4) wildlife mitigation (years 1, 2, 5,and 10). Monitoring associated with fish passage or $2,520,000 is associated

with ESA requirements. Items 1-2 are considered specific restoration costs and 100% of these costs are allocable to ecosystem restoration. Items 3 and 4 are associated with reservoir impacts primarily created by storing water for water supply during phase 1 and are therefore considered to be specific water supply costs and are 100% allocable to water supply. Shown in Table B2-33 is a summary of the recommended allocation of labor costs associated with monitoring fish and wildlife features. Also, see table 10-3 of Appendix F1 of the feasibility report for the specific line items associated with the 4 items of monitoring and their estimated costs.

TABLE B2-33. HOWARD HANSON DAM ADDTIONAL STORAGE PROJECT - ALLOCATION OF LABOR COSTS ASSOCIATED WITH-PROJECT MONITORING

Item And Years Of Monitoring	Allocation	Total Cost	Specific Water Supply	Specific Restoration
(1) Downstream Impacts (Years 1-5)	100% Restoration	$942,000	$0	$942,000
(2) Fish Habitat Restoration (Years 1-5 and 10)	100% Restoration	$302,000	$0	$302,000
(3) Fish Habitat Mitigation (Years 0-5 & 10)	100% Water Supply	$171,000	$171,000	$0
(4) Wildlife Mitigation (Years 1-5 & 10)	100% Water Supply	$328,000	328,000	$0
Fish Passage Yrs. 0-10 (ESA)		**$2,520,000**		
TOTAL		**$4,263,000**	**$499,000**	**$1,244,000**

The current construction cost estimate (excluding ESA costs) for this project in 1997 prices and the results of this allocation analysis which allocates 61.2% of the joint-use construction costs to water supply and 38.8% to ecosystem restoration plus the specific costs associated with each project purpose to include construction monitoring, show that an estimated $15,162,000 is allocable to water supply and $10,339,000 is allocable to ecosystem restoration. See Table B2-34 for a summary of the cost allocation results.

TABLE B2-34. HOWARD HANSON DAM WATER SUPPLY AND ECOSYSTEM RESTORATION PROJECT COST ALLOCATION OF PROPOSED PROJECT (OCTOBER 1997 PRICES) [8]

	M&I Water Supply	Ecosystem Restoration	Total Cost
Specific Cost [9]	$2,877,000	$1,633,000	$4,510,000

[8] See tables B2-32 and B2-33.

[9] Excludes monitoring costs.

Joint-Use Costs	11,786,000	7,462,000	19,248,000
Allocation of the New Project Construction Costs w/o Monitoring	$14,663,000	$9,095,000	$23,758,000
Specific Monitoring Costs	499,000	1,244,000	1,743,000
Total Proposed Project	$15,162,000	$10,339,000	$25,501,000

f. Share of Existing Project Construction Costs. In addition to the construction costs associated with the proposed project are the construction costs associated with the existing HHD project. The cost sharing formula requires the local sponsor to repay a portion of the existing project when storage in an existing project is used to provide M&I water supply. The sponsor's share of the existing project construction cost is based on a remaining benefits concept and computed as indicated in ER1105-2-100, Paragraph 4-32e. It states that the sponsor shall be responsible for a share of the existing project based on an amount equal to 50 percent of the sponsor's savings. That is, the sponsor's savings equals water supply benefits minus the present-worth cost of the proposed modification attributed to water supply or remaining benefits. Table B2-35 shows the computation of sponsors estimated share of existing project use for water supply.

TABLE B2-35. HOWARD HANSON DAM WATER SUPPLY AND ECOSYSTEM RESTORATION PROJECT COMPUTATION OF SPONSOR'S ESTIMATED SHARE OF EXISTING PROJECT USE FOR WATER SUPPLY [10]

AVERAGE ANNUAL COST OF LEAST COST ALTERNATIVES (i.e. Water supply Benefits in Oct 97 Prices)	$1,418,000
LESS: SPONSOR'S SHARE OF WATER SUPPLY COSTS OF PROPOSED PROJECT(Oct 97 Prices)	$1,294,000 [11]
REMAINING BENEFITS	$124,000
SPONSOR'S SHARE IS 1/2 THE REMAINING BENEFITS	$62,000
CAPITALIZED AMOUNT @ 7 1/8%	$842,000

g. Summary of the Construction Cost Allocation.

Shown in Table B2-36, is a summary of the estimated construction costs, in 1997 prices, allocable to water supply and restoration. The total includes construction costs associated with the new water supply and restoration project plus the construction costs associated with the existing project assigned to water supply.

TABLE B2-36. SUMMARY OF COSTS ALLOCATION RESULTS NEW PROJECT PLUS SHARE OF EXISTING PROJECT

[10] Numbers rounded to nearest $1,000.

[11] Based on the allocated water supply construction costs of $15,162,000 excluding IDC (see table B2-34) plus the present worth specific water supply monitoring costs of $383,000 annualized over the 50 year project life at 7 1/8 percent plus $150,000 in water supply operation and maintenance costs associated with the proposed project.

	M&I WATER SUPPLY	ECOSYSTEM RESTORATION
NEW PROJECT	$15,162,000	$10,339,000
EXISTING PROJECT	842,000	0
TOTAL ALLOCATION	**$16,004,000**	**$10,339,000**

In addition, the following costs were assigned to ESA prior to the allocation of remaining multiple purpose project costs.

COSTS ASSIGNED TO ESA

Fish Passage	$44,587,000
Monitoring	2,520,000
Rock Placement & Woody Debris	178,000
TOTAL ESA COSTS	**$47,285,000**

10. Cost Sharing

As previously mentioned, M&I water supply and ecosystem restoration have different cost sharing requirements. All costs (construction, operation, maintenance and replacement costs) allocated to water supply, including monitoring, are considered non-federal costs and are the responsibility of the project sponsor. Construction costs allocable to restoration are cost shared 65% federal and 35% non-federal.

a. Construction Costs. Shown below are the estimated construction cost sharing requirements, including ESA requirements, based on the current sharing of construction costs and the results of the cost allocation. The cost sharing numbers are in 1997 prices as well as to the mid-point of construction or full funded dollars. The full funded share of costs allocated to each purpose was determined based on the percent of construction costs allocated to each purpose using October 1997 price level and the full funded estimate of project construction costs. That is, based on a full funded construction cost estimate of $83,825,000, 73% was allocated to the federal government and 27% was allocated to the non-federal sponsor as shown in Table B2-37.

TABLE B2-37. HOWARD HANSON DAM ADDITIONAL STORAGE PROJECT
FEDERAL AND NON-FEDERAL SHARE OF CONSTRUCTION COSTS
(OCT 1997 PRICES AND FULL FUNDED)

	COST SHARING BY PROJECT PURPOSE		
PROPOSED PROJECT	FEDERAL	NON-FEDERAL	TOTAL

ESA	**$47,285,000** [12]	**$0**	**$47,285,000**
WATER SUPPLY	$0.0	$16,004,000	$16,004,000
ECOSYSTEM RESTORATION	$6,720,000	$3,619,000	$10,339,000
TOTAL COST-PROPOSED PROJECT (97 Prices)	$54,005,000	$19,623,000	$73,628,000 [13]
ALLOCATED SHARE IN PERCENT [14]	73%	27%	100%
FULL FUNDED SHARE	**$61,192,000**	**$22,633,000**	**$83,825,000**

[12] Includes ESA costs as follows: Fish Passage of $44,587,000 + Monitoring of $2,520,000 + Mitigation of $178,000

[13] Includes total multiple-purpose project cost of $72,786,000 + $842,000 for existing project.

[14] Percentages rounded to the nearest whole number.